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# The search for active learning: Lessons from a happy accident

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## Abstract

This article suggests that the concept of 'active learning' has different meanings. These meanings are created in the dynamic and variable relationships between the uses of learning technologies and approaches to pedagogy. Institutions play a key role in mediating these relationships, privileging some meanings of 'active learning' over others. More dialogical forms of active learning call for changes in the mediating role of the institution. This article draws on a case study of the use of Electronic Voting Systems to teach social research methods.

**Keywords:** active learning, learning technology, pedagogy, institution, commodified, consumerised, reflexive, dialogical, EVS.

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## Introduction

In this article we describe the use of an Electronic Voting System (EVS), also known as 'clickers', in teaching social research methods to first year undergraduate students. The initial idea for this use was prompted by a familiar pedagogical problem: 'can research methods ever be interesting?' (Benson & Blackman 2003). Blackman & Benson's solution to the problem was a complete re-design of a module in a way that embraced concepts of 'independent', 'active' and 'student-centred' learning. The approach adopted here acknowledges the importance of these ideas, but takes into account the caveat from Barraket (2008) that the concept of 'active learning' is problematic. We draw on our experience to contribute to the debate about the uses of technologies such as EVS in higher education and the part these uses play in reshaping the meaning of the idea of 'active learning'. In the following sections we explain the local context, looking first at the institutional setting for the acquisition of EVS by the university, and then at the pedagogic context in which we used EVS. We then consider the different definitions of active learning

that teachers draw on when using learning technologies in the design and implementation of teaching programmes.

## **The institutional search for active learning: introducing EVS into the university**

In recent years, the University of Bath, like all UK universities, has become more aware of the significance of improving the quality of student assessment and feedback processes, particularly since the inception of surveys such as the National Student Survey (NSS). Whilst overall student satisfaction scores have remained high, the satisfaction ratings for assessment and feedback have been lower (Figure 1).

	Overall satisfaction	Assessment and feedback
2005	85 %	49 %
2006	83 %	48 %
2007	85 %	55 %
2008	88 %	56 %

Figure 1: NSS Results 2008 University of Bath

Although the assessment and feedback scores have improved, they remain a source of concern to the institution because the University of Bath is below the sector average for all HEI institutions. Indeed such is the increasing focus on assessment and feedback as a result of NSS that the Higher Education Academy (HEA) commissioned research on longitudinal data from institutions' internal student surveys. One of the key recommendations from this report was to encourage institutions to “develop institutional student feedback and action cycles... to inform continuous quality improvement processes” (Williams, 2008: 3). These processes provide the framework for university learning and teaching strategies and, in turn, the rationale for the acquisition of learning technologies.

These strategies have drawn on ideas about ‘active’ and ‘student-centred learning’, particularly for formative assessment.. For example, Pintrich and Zusho (2002) refer to a notion that formative assessment and feedback can be used to “empower students as self-regulated learners”. Nicol and McFarlane-Dick (2006) cite research where learning is seen to be “more commonly conceptualised as a process whereby students actively construct their own knowledge and skills”, facilitated by the lecturer rather than necessarily driven by them. Such approaches have influenced the acquisition of learning technologies such as Virtual Learning Environments (VLEs), where in one particular case, a VLE (Moodle) is based on the psychological theory of social constructivism. Moodle “extends constructivism into social settings, wherein groups construct knowledge for one another, collaboratively creating a small culture of shared artefacts with shared meanings” (Moodle Docs, 2009). The autonomous, active learner, aided by learning technologies, has thus become the subject of learning and teaching strategies.

Crook (2002), however, sounds a cautionary note about the assumed qualities of this active learner and its virtual practices. He notes that constructivism, unlike the behaviourist and cognitivist theories that have also had an influence on the design of educational technology, 'view(s) the learner as an active agent', but constructivism shares the behaviourist/cognitive view of learning as a process of acquiring a set of 'entities' (Crook 2002: 108). Crook questions this idea of learning as a process of acquiring entities, and offers instead a 'connectionist' view that learning is more like 'finding our way around' than the acquisition of anything. From this point of view, technology is less important than the 'contexts in which technology can be recruited to catalyse engagement of learners with authentic disciplinary practices .... Learning ... seems more a matter of participation than acquisition' (Crook: 111). The use of EVS that we describe later was informed by this understanding of the meaning of 'active learning'.

In September 2008, the e-Learning team at the University of Bath piloted a TurningPoint-based EVS. The intention of the pilot was to explore the use of EVS as a mechanism for providing students with more effective and immediate feedback during face to face teaching sessions. The TurningPoint EVS consists of handsets (or 'clickers') and USB Radio Frequency (RF) receivers. Unlike the infra-red models that had been previously used on a small scale within the university, these clickers did not require a 'line of sight' between the handset and the USB RF receiver, which can support up to 1000 clickers. As such, the system was suitable for use in large teaching rooms, some of which can seat over 300 students.



Figure 2: The EVS hardware – the USB RF receiver (left), together with a clicker.

The software, TurningPoint 2008, a Microsoft PowerPoint plug-in, is an easy to use application which allows the creation of slides used to display questions to which students respond using the clickers, without a significant amount of training for users. The software was centrally rolled out to all PCs on campus, including those in lecture theatres and student-used PCs in the Library and Learning Centre. Additionally, TurningPoint 2008 could be downloaded, and installed on personal PCs, from the project website at: <http://go.bath.ac.uk/evs>. The project website – presented in the form of a blog – has been used for dissemination of both case studies of use (labelled *session reports*) and good

practice. Over seventy members of teaching and administration staff have been trained in how to use the EVS. Most of these staff have used the EVS in lectures, booking out an average of 100 clickers per session.

Staff reaction to the introduction of an EVS has been positive.

*It's probably more changed the way the students learn. But it has changed the total learning experience. I used it in problem classes, not lectures.*

*On the single occasion I used it, it enabled me to ascertain immediately whether students had grasped a topic and where they were having problems and then respond to it so the teaching was more fluid and interactive.*

(University of Bath staff EVS Survey, 2009)

Drawing on their experience of the use of EVS within the University of Bath, Davenport et al. (2009) suggest five areas in which EVS could be used to support learning and teaching activities in a face-to-face context,

- for diagnostic assessment at the beginning of a lecture
- for monitoring understanding of a the context by students
- for enabling the provision of immediate feedback within the context
- for keeping students actively engaged in their learning
- for promoting peer interaction and support

Students have also commented on EVS, and welcomed it. For example:

*It was useful to be able to see my answer in comparison to other people's. This gave me an easy way to benchmark my learning against others to see how I was doing on the course.*

(student survey, 2008)

These uses of EVS and reactions to its use echo the messages from the growing EVS literature. Pritchard (2006), for example, describes ways in which EVS can be used 'to support established pedagogical strategies', while Caldwell (2007) argues that student engagement is more likely if clickers are used in large lectures. In other words, technology can deliver improvements to teaching without changing it significantly. This is a view we refer to as technological determinism.

At the institutional level, therefore, there has been an attempt to re-construct pedagogic relationships in line with a particular notion of 'active learning'. This has been driven by institutional concerns about student survey scores and is embodied in an imagined figure of the student as a consumer (Hughes 1998) who wants more active participation in the learning process. We discuss this particular notion of active learning later, but note here that the 'student as consumer' has been inserted into institutional learning and teaching

strategies. Within these strategies, technology is privileged as the key determinant of the possibilities for 'active learning', and the notion of 'active' is based on constructivist ideas of learning as a more autonomous process of acquiring knowledge. The search for active learning is the acquisition by the institution of hardware and software that can demonstrably create the spaces for this kind of active learning and, more importantly, improve the survey scores. It was this search that led to the acquisition of an EVS by the university as a potential solution to the 'problem' of low NSS scores for assessment and feedback. The introduction of EVS was accompanied both by a few nudges in the direction of established uses of EVS elsewhere, and by a cautious process of piloting and reflection on the most practical ways of making the technology available. However, despite the fact that the uses of this new technology prescribed by the institution were heavily inflected with consumerist and technologically deterministic notions of active learning, spaces were also created for uses that are driven by other notions of active learning. We turn to these in the next section.

### **The pedagogic search for 'active learning': changing the way teaching is done**

**Social** research methods are a core element of the undergraduate programmes in the Department of Social and Policy Sciences at the University of Bath. They are taught primarily in the second year of the three year programmes to prepare students for an extended piece of work in their final year. Until recently, the first year of the programmes contained no element of research methods or practice. Students were, however, required to take modules in 'core skills for social science' (primarily information technology and study skills) and quantitative data analysis. Both of these modules were taught in conventional ways. Large lectures were supported by smaller 'lab sessions' where students practised IT skills and quantitative data analysis. Both modules produced low student satisfaction scores, and the quantitative data module produced a high number of fails requiring students to re-take assessment. The students' main complaints about the 'core skills' module was that it was too 'basic'. Quantitative data analysis was considered too scary for a significant minority. The learning outcomes for both modules were, however, still seen as a core element of the programmes.

When we began to think about how the teaching could be improved, we took note of evidence that 'students want less on skills and more on issues', that 'students find quantitative methods modules dull and uninvolving' (Letherby 2006: 246) and that active learning can be encouraged by including a variety of activities such as problem solving, asking and answering questions and discussing problems and issues (Race 1999). For these reasons, we introduced a series of gradual changes to the curriculum and pedagogic strategy. These were based on the ideas that the pedagogical problems of teaching research methods and 'core skills' can be seen as two sides of the same coin, and that root and branch changes should be avoided because they run the risk of failure. The main changes made to the pedagogic strategy were:

1. to move the more mathematical elements of quantitative data analysis to the second year of the programmes
2. to introduce elements of group work to the first year of the programmes
3. to embed 'core skills' in a loosely connected set of research-based and research-oriented activities, both group and individual, supervised by postgraduate research students

We were guided in the last of these changes by Healy's suggestion that

*students are more likely to gain most benefits from research when involved in research through various forms of active learning.*

(Healy 2005:68)

This point is related to Healy's more general argument that there are 'many pressures that are pulling research and teaching apart', and while 'significant changes in ways of working and in power relationships between staff and students are needed to prevent this, 'modest shifts in practice' towards different forms of active learning are an appropriate and practical response. We saw these changes, including our use of EVS, as examples of such modest shifts.

The context for our use of EVS in teaching research methods was therefore located in a process of change from a more traditional approach to teaching first year social science to one which cautiously seeks to find new ways of achieving what are more or less the same learning outcomes. This point is made here because much of the literature on the use of EVS focuses quite narrowly on the ways in which the technology can liven up an otherwise dull lecture, an approach which, in our view, runs the risk of incorporating the technology into conventional models of teaching, thereby missing an opportunity to address the more fundamental pedagogic questions raised by notions of 'active learning'. There is evidence that as the uses of EVS have become more widespread and the novelty has worn off, others too are using EVS in a more circumspect manner. For example, in a review of the uses of EVS for teaching, Simpson and Oliver (2007) argue that as EVS use has increased, discussion has shifted away from a primary focus on the technology and its implications for teaching towards a more complex view of the ways in which pedagogic and institutional factors shape the uses of the technology. Teachers working in other universities will, of course, encounter these same factors, though not necessarily in the same ways as we did. For this reason, others wishing to use EVS for the purposes outlined below will need to take into account their own local contexts.

## **How the EVS was used**

We wanted to harness the EVS technology to promote active learning and methodological literacy among first year undergraduate students. Irving and Young (2004) suggest that encouraging active learning and developing interactive approaches to lecturing have a

number of benefits including challenging and checking students' assumptions, opening students' receptivity, accustoming them to having a voice and helping those with different learning styles (2004:130). They also note that 'interactive lectures may change the culture of learning by making learning mutual...accessing student knowledge, mobilising collective learning, creating a group climate for learning [and] enabling students to take some control and power over the learning process' (ibid). This definition of active learning implies seeing EVS as more than a way of spicing up a lecture. Irving and Young also note that 'despite criticisms in the literature on pedagogy, lecturing continues to be the dominant teaching method on most undergraduate programmes' (Irving and Young 2004:121). While traditional 'chalk and talk' methods of teaching are useful for introducing students to debates around sampling; validity and reliability; operationalising concepts; difficulties in comparing data and the problematic nature of 'evidence', we felt that this method of teaching was less appropriate for introducing students to the 'nuts and bolts' problems of survey design and a more 'hands on' approach was needed. Following short presentations of research findings from four social researchers working in the university, students were divided into small groups and asked to conduct a literature review on one of three topics. Students were then required to formulate a research question based on their literature review, and to devise a set of survey questions that could produce evidence to be used in providing some answers to their research question. 84 students worked in small groups to carry out this work, and each group created four survey questions. Small group meetings were supported by online forums in the VLE. We used the clickers to pilot the survey questions which the students had designed. The clicker exercise was therefore guided by a prior activity, which had already organised students into more active learning communities than had been the case in conventional large lectures. We make the point here, though, that the clicker exercise and associated moves towards 'active learning' did not (and in our view cannot) completely replace the conventional large lecture. We share Draper and Brown's view (Draper & Brown 2004) that EVS is no 'magic bullet' and is not necessarily better than other, much older ways of achieving either learning or interactivity, but that 'it makes the desired effect (...) easier to achieve, more often, in more contexts, and with much less effort' (ibid: 93).

Seventeen groups generated a main research question and four associated survey questions. The primary research question and four associated survey questions were displayed in turn to the whole group. Each group explained its research question before the larger group responded to the survey questions using the clickers. Turning Point displays the results immediately, which allowed for discussion of both the results and the questions that had produced them. All students were encouraged to comment on the approach taken by each group and whether the main research question could be addressed through the data generated by the four survey questions. Students commented on the appropriateness of the wording of each question and any other issues they thought relevant, such as the fact that some students were choosing not to answer problematic questions. They also made suggestions for reducing ambiguity, reducing bias or otherwise improving the wording of the questions.

Throughout the course of the session there were a number of questions that many students identified as particularly difficult to answer. We were able to reflect as a group on why



these questions were difficult to respond to which led to a discussion of sensitivity and ethics in social research.. A postgraduate research student present during the clicker session noted;

*'(EVS) is a powerful tool which can help students gain some practical feeling of quantitative research methods as well as reflecting upon the complexity [quantitative research] entails, the most obvious and common mistakes as well as those less evident and harder to detect without practical experience. It allowed students to 'defend' their way of formulating questions and collectively reflect on what could have been done better. I found the exercise very productive. It confronted students with the idea that their questions/questionnaires do portray assumptions which they must be aware of and, eventually, be able to defend in public.'*

Asked to reflect on what they were learning during the clicker exercise students commented on the general principles of survey design, what makes a 'good' and a 'bad' survey question, the importance of piloting surveys, the problems with leading or loaded questions, problems with sensitive questions, the relative nature of concepts (ie different things mean different things to different people according to factors such as age, gender, ethnicity and experience), the problems of operationalising concepts and thinking about indicators and issues around non-response.

The clickers were also used to ask students about the usefulness of EVS as a way of developing their understanding of common problems in the creation of survey questions. Almost all agreed that it was 'a good way of seeing some of the problems associated with the design of survey questions', though a few also said it was a waste of time or a gimmick.

Because EVS allowed the data to be captured immediately, in electronic format, it could then be easily distributed to students in the form of Excel spreadsheets. Data was uploaded onto the Moodle VLE and students were subsequently able to manipulate both their own data as well as those of other groups, thus providing them with an opportunity to practice quantitative data skills using statistics that they themselves had produced.

The whole session encouraged a more dialogical relationship among students and between students and teaching staff. It also gave the students a sense of having developed a set of skills in relation to 'doing' research rather than just learning about doing it. It exceeded our expectations in terms of its suitability to the task of teaching about the principles of research design in general and survey question design in particular. This session enabled us to address both of these areas using 'issue based' questions designed by the students whilst increasing the possibility of both independent and collaborative learning and lecturer –student dialogue.

## **‘Active learning’: possibilities and limitations**

Earlier, we noted Barraket’s observation that the notion of ‘active learning’ is problematic. For example, in emphasizing student autonomy, some forms of active learning run the risk of transferring teaching responsibilities to students. She also points to the different meanings of ‘active’ arising from cultural differences among students. Barraket’s points are valid, but they raise questions about active learning that are primarily related to pedagogic problems in isolation from their wider setting in institutional and technological contexts. These contexts have become more important in shaping the meanings of active learning and in creating both possibilities for and limitations to active learning as a pedagogic strategy.

Although the idea of active learning has a long history, it has become more prominent in debates about HE pedagogy in two ways. First, it has come to be associated with the possibilities for ‘blended learning’ created by technological innovations. Blended learning refers to the ways in which different modes of student engagement with curriculum materials are combined, and different kinds of ‘activity’ are required from students. Technologies are seen as the midwife of these new forms of pedagogy and of an ever-expanding notion of ‘active learning’. While ‘blending’ is seen as a pedagogic strategy for managing the uses of technology and adapting it to achieve particular learning outcomes, the underlying assumption is of a one-way relationship through which technology determines the possibilities for active learning and its benefits can be measured in terms of changes in student performance in assessed work (see for example Turney et al 2009). Pedagogic strategies that rest primarily on the management of the uses of technology may produce more variety in the ways that students are expected to engage with curriculum materials, but, as Crook suggests, they do not guarantee that engagement will be the outcome of a strategy. The increasing use of technology also requires what Letherby (2006) refers to as a ‘technological imagination’ in order to get the most from the learning technologies. The problem facing teaching staff, however, is that the spaces in which this imagination can be exercised are few and far between, and are often closed off by institutionally prescribed uses for technology.

This relates to the second way in which the notion of active learning has become more prominent. As suggested earlier, active learning can be seen an institutional strategy for the management of a body of students that has not only grown in size but is also increasingly seen as ‘consumers’. From this point of view, ‘active learning’ is seen as a solution to demands for more ‘feedback’. Our own account of the introduction of EVS in the University of Bath provides a typical example of this. However, Naidoo warns that the pressures that have led universities to see students as consumers, primarily the introduction of ‘quasi-market levers’ such as tuition fees and league tables, can compromise pedagogic relationships. This highlights a tension between active learning as an institutional strategy, in which students are seen as consumers of knowledge as a commodity, mirroring the information hungry ‘active student’ depicted in Crook’s critical account of constructivist learning theory, and active learning as a pedagogic strategy, in which students are seen as co-producers of knowledge. The former leads to a

*standardized model of teaching ... which sees the task as simply one of providing students with more information rather than the skills and dispositions to acquire knowledge ... Feedback to students may be rolled up into summative assessment, in the worst cases reducing it to the results of computerized multiple choice tests rather than the detailed qualitative feedback required for high quality learning*

while the latter allows

*activities through which teachers adjust the curriculum and pedagogy to the needs of individual students, as well as peer-group learning,*

(Naidoo (2005:32)

Thus the newer meanings of the term 'active learning', which are inscribed with consumerist and technologically determinist meanings, are sharply opposed to older notions, as they tend to reduce pedagogy to a set of strategies for managing technology or increasing the flow of information to students. The tensions between these newer and older meanings of 'active learning', between prescribed uses of technology and suppressed imaginations, are not particularly new to teachers, who, as D'Andrea and Gosling (2005) point out, have been caught up in 'power struggles' over the curriculum for some time. D'Andrea and Gosling attempt to capture these power struggles by distinguishing between technologically-based and technologically-mediated approaches to teaching and learning, suggesting that the latter are preferable because they are 'pedagogically underpinned'. This is a useful distinction, which we draw on later in this article. It is, however, based on the assumption that the relationships between technology and pedagogy are, potentially at least, antagonistic, and that given a free rein, technology will somehow eliminate pedagogy. There are inevitable tensions between some approaches to pedagogy and some uses of technology, but when D'Andrea and Gosling claim that

*unlike what occurred with previous introductions of learning technologies, where they were added on the already existing learning and teaching approaches, the new learning technologies set the agenda for their implementation themselves*

D'Andrea & Gosling (2005): 132-3)

it is not only the relationships between technology and pedagogy that are screened out of view, but also the role of the institution in mediating these relationships. In order to understand the 'agenda' for the implementation of new learning technologies, and within this the changing meanings of 'active learning', it is important to analyse the ways in which notions of active learning are created and inserted into institutional learning and teaching strategies. The starting point for our analysis is that these meanings are determined not by the technology, nor by the pedagogy, but by the dynamic relationship between them, and by the role of the institution in mediating this relationship. This role is the key to unlocking the as yet unimagined possibilities for using technologies to improve teaching and learning.

In the Figure 3 we represent the different uses of EVS by locating them in the relationships between technology and pedagogy. Pedagogy is represented on a continuum from teacher-

centred to student-centred. The uses of technology, in this case EVS, are represented as ‘technologically-based’ (what can technology do for us ?) or ‘technologically mediated’ (how can we use the technology ?). In each cell of the matrix we give examples of typical uses of EVS.

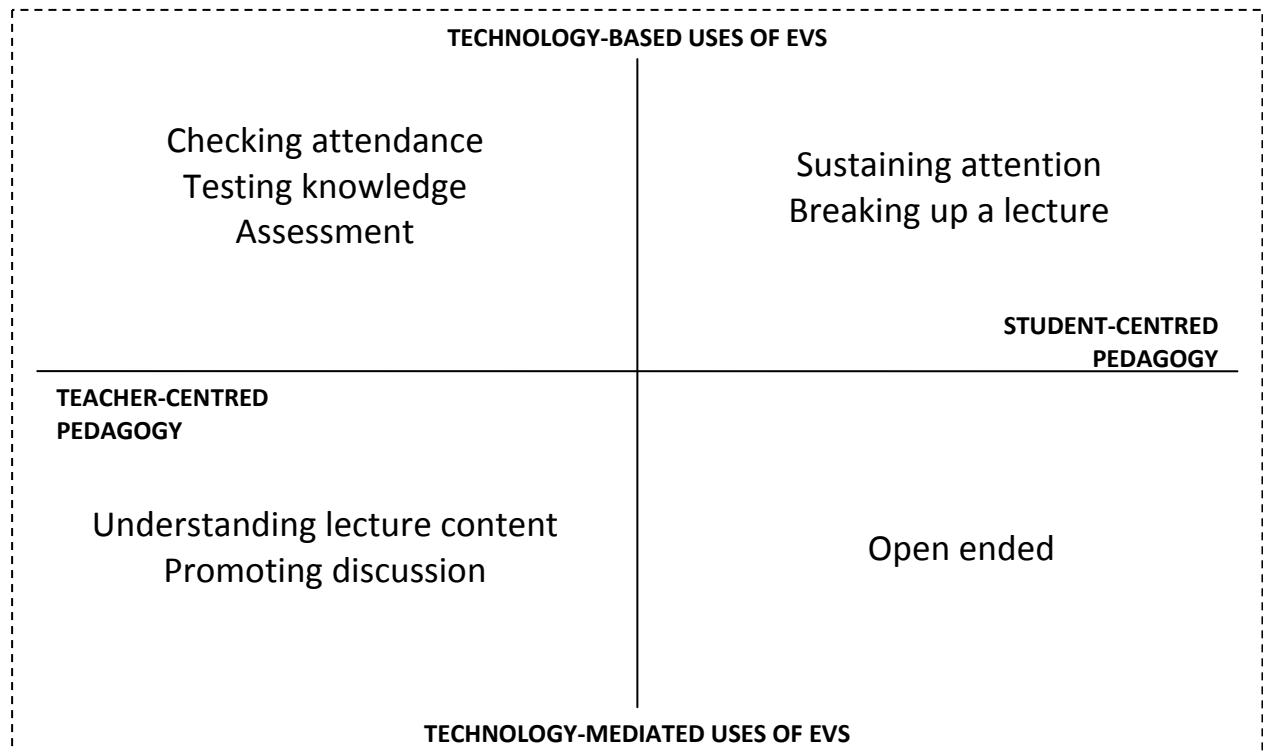


Figure 3: Different uses of EVS

The different kinds of ‘activity’ implied by these uses of EVS each imply a different meaning of ‘active learning’. In the two upper cells, active learning can be seen as closer to the ‘standardised model of teaching’ generated by pressures on institutions that lead to the commodification and consumerisation of education. It is relatively straightforward to incorporate EVS into a conventional lecture, using the software to ask questions that test students’ comprehension, and thereby introducing an element of ‘active learning’ to a teaching format that is typically a one-way flow of material from lecturer to students. As we indicated earlier, our own institution’s approach to EVS tended to prescribe such uses, but the problem with these approaches is that they can lead to a sense, among some students at least, of being ‘coerced into a pedagogical strategy’, especially when used to check attendance or for assessment purposes (Graham et al 2007). Additionally, these prescribed uses of EVS all focus on what the technology can do for teaching without changing it fundamentally. Pritchard, for example, argues that ‘the real benefit of this technology lies in its ability to support established pedagogical strategies’ (Pritchard 2006: 5). It can be used for knowledge testing, and its inherently interactive qualities not only sustain attention and break up lectures, but also create ‘teachable moments’. From this point of view, the key to achieving an enhanced learning process through the use of EVS is the design of effective

questions by the teacher and Beekes' case study, referred to earlier, suggests that it is difficult to argue against its value in increasingly crowded lecture rooms. However, the history of teaching is littered with examples of technological innovations that have been trumpeted as a solution to all pedagogic problems, but which have somehow failed to live up to that promise (Oliver 2009). The underlying assumption of a deterministic relationship between technology and pedagogic practice can lead to the incorporation of new technologies into existing approaches to teaching in ways that do not disturb pedagogic practice. If this happens, the technology can come to be seen as a gimmick which, once the novelty has worn off, does not necessarily enhance learning. Simpson and Oliver point out that there is increasing doubt that 'using handsets equates to meaningful interaction'. (op.cit.: 10). In other words, the activity of pushing a button reduces the idea of 'active learning' to the point where it can be seen as little more than compliance with a model of learning that ultimately reinforces passivity.

EVS, like all technologies, is open to other uses based on different definitions of active learning, and the two lower cells in the matrix give examples of these. The lower left hand cell can be seen as a shift towards more 'conversational' forms of lecturing (Laurillard 2002), and these have been adopted by many advocates of EVS. 'Active learning' in these cases can be seen as promoting reflection on materials presented by teachers. The lower right hand cell contains all those uses where students have more control over the material and the technology, and these uses are therefore closer to what we would describe as dialogical.. Draper (2008) describes some of the uses of EVS that could be seen as dialogical, in particular having students design the questions, which he argues can lead to better learning because students have to give reasons why answers are right or wrong, and not just display their knowledge. This approach is closer to the idea of active learning that we described earlier, when we argued that active learning involves challenging and checking students' assumptions, opening students' receptivity, accustoming them to having a voice, helping those with different learning styles and enabling students to take some control and power in the learning process.

There are differences between EVS and other forms of educational technology. The most obvious of these is its relative simplicity compared to VLEs. EVS does not fit easily into Laurillard's classification of 'educational media', perhaps because any attempt to classify media needs to take into account that they can be used in quite different ways, so it is the uses of media that need to be classified rather than the media themselves. From this point of view, therefore, it is possible to draw on points about the uses of EVS to make generalizations about the uses of all technology/media in education.

Using the same dimensions of difference in approaches to both pedagogy and the uses of technology, Figure 4 represents our view of the different meanings of the notion of 'active learning' that are constructed in the dynamic relationship between pedagogy and the uses of technology.

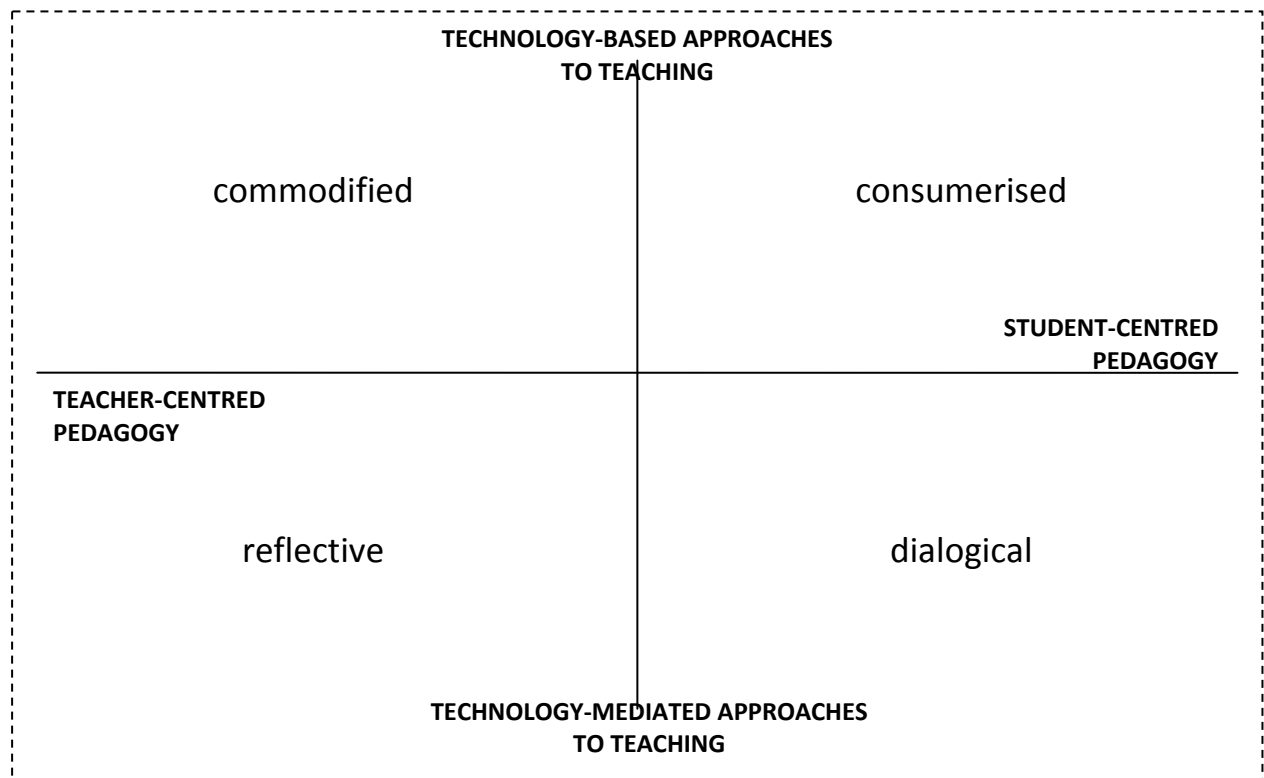


Figure 4: Different meanings of active learning

Commodified forms of active learning are those that treat both students and knowledge as commodities. Student 'activity' can be monitored, checked and assessed, and the forms of activity typically associated with this form of active learning are based on a view of knowledge as an entity to be acquired, stored and reproduced on request. Consumerised forms of active learning may typically display the characteristics of commodified forms, but additionally create the possibility for students to work at their own pace or select from a menu of 'blended' activities. Reflective forms of active learning create the space for students to question and discuss materials provided by teachers. Dialogical forms of active learning create the space for students to create their own materials that can become the focus for discussion and questioning. In practice, these different types of active learning do not appear in 'pure' forms but combine in different ways according to local contingencies. The point of representing them in this way is to highlight the role of the institution in mediating the relationship between pedagogy and technology. Institutional pressures tend, for reasons suggested earlier, to promote commodified and consumerised notions of active learning, but spaces are also created where these meanings can be challenged. Simpson and Oliver's point, that discussion about EVS use has shifted away from a primary focus on the technology towards a focus on the ways in which pedagogic and institutional factors shape the uses of the technology, suggests that these spaces are becoming more visible. The question we wish to pose at the end of this article is about the role of the institution in nurturing these spaces through the ways in which it acquires, organizes and enables different uses for technology.

Laurillard's prescription for an elaborate institutional infrastructure emerges from her application of the idea of a conversational framework for learning and teaching to the development of universities as learning organizations. She readily acknowledges, however, that 'for many academic staff, the introduction of new technology has been a nightmare of overwork and lack of support' (Laurillard op cit: 229). She also points out, almost as an aside, that 'many of the pilot experiments on learning technologies in universities have been conducted in isolation from the institutional management process' (ibid: 216). This suggests that elaborate structures may be yet another reason for teaching staff to have nightmares if they are constantly required to submit themselves to Dragon's Den style bidding processes to secure small amounts of money to fund experiments, or worse, if they are successful in that, to conform to the demands for evaluation, spreading 'good practice' and all the other paraphernalia of quality assurance. Laurillard's idea of equating student learning processes with institutional learning processes does, however, raise an interesting question: if the idea of active learning is good for students, why shouldn't it be applied to the ways in which universities develop their learning and teaching strategies ? And if it is applied, how and where should teaching staff set about the work of re-inventing pedagogic strategies ?

D'Andrea and Gosling also use the metaphor of a conversation to describe a range of institutional support networks, some formal, some informal, which they argue might help universities as learning organizations to 'unlearn' some of their conventional ways of knowing and working. They suggest that these networks can create the space for 'structured serendipity' – the occasioning of happy accidents such as our own use of EVS. On the face of it this seems a more attractive prospect, and one that teaching staff may find more convincing. However, their suggestion that learning technologies can be effective 'levers for change' shows only how insistent are the voices of technological determinism and commodification with which universities now speak in their 'conversations' about learning and teaching.

We came to use EVS in the way we did because of the co-incidence of a number of factors: the institutional search for technologies that were seen to promote the kinds of active learning that might raise student survey satisfaction scores, the pedagogic search for new ways of teaching about old problems, but crucially the chance meeting between an academic and a learning technologist outside the formal structures of institutional management. Crook's evidence indicates that for students, 'brief, serendipitous and frequent conversations' with both peers and staff are very important to their patterns of study and, arguably, to dialogical notions of active learning. It may also be the case that teaching staff also value these more than they do the formal structures of the institution, and that it is the spaces for these kinds of conversations that should be nurtured if technological imaginations are to be kept alive and active.

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